COMPUTER-BASED SIMULATION TO SUPPORT TRAINING FOR COMPLEX AND DIFFICULT INCIDENTS

EXECUTIVE DEVELOPMENT

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ABSTRACT

King's Point Volunteer Fire District was a rural residential community which is fast becoming a light industrial area bringing with it complex and difficult emergency incidents. Determining the appropriate tactical option and then the resource requirements for these complex and difficult incidents are fastidious for most experienced chief officers, not to mention in-experienced officers. The problem that prompted this research was that Kings Point Volunteer Fire Department does not have experienced chief officers to manage complex and difficult incidents. The purpose of the research project was to investigate existing training methodologies, both human mediated and computer-based, that teach chief officers command responsibilities.

This project employed historical research methods to (a) determine the deficiencies of current training methods for chief officers regarding complex and difficult incidents, (b) determine the advantages of computer-based multimedia simulation training, (c) determine the limitations and deficiencies of computer-based multimedia simulation, (d) determine if computer-based multimedia replicates the reality of complex and difficult incidents, (e) determine if computer-based multimedia will influence learning, and (f) identify if training with computer-based multimedia simulation is worth the expense.

The procedure used involved a review of academic and trade journal publications, interviews and a questionnaire. A comparison of literature reviews of human mediated training methodologies to computer-based training using simulation was made. In addition, interviews and a questionnaire were used to obtain chief officers' perceptions of computer-based training.

The major findings of this research were computer-based simulation will allow chief officers to rehearse, practice and retain skills for complex and difficult incidents in a virtual reality environment without causing harm to the environment and/or causing injury to firefighters. The recommendation resulting from this research indicated a need for Kings Point Volunteer Fire Department to train chief officers command skills through the use of computer-based technology. However, it was also identified that Kings Point, as well as many of the municipalities in Central Florida, does not have the physical budget to purchase computer-based training. Therefore, it was recommended that another agency, such as the National Fire Academy, International Fire Chiefs' Association, Florida Fire Chiefs' Association and/or the Florida State University System Board of Regents purchase a computer-based multimedia

simulation which can augment the training of chief officers for complex and difficult incidents, as well as developing a infrastructure to deliver this technology via the establishment of an Internet service.

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INTRODUCTION

Managing complex and difficult emergency incidents requires in-depth knowledge and skills from command officers at all levels within the fire service. "The consequences of poor management can be significant with the possibility of injuries to the public…" (Williams, 1996, p.1), as well as firefighters and result in extensive damage to property. Because of this, there is a need for chief officers to be competent and well versed in the management of emergency incidents. Also, many chief officers have focused so much on the physical act of fire fighting that they have failed to develop their critical decision making skills (Coleman, 1994). Therefore, there needs to be a means to train chief officers and practice the skills needed to effectively manage and command an emergency in a controlled environment (Farmer, 1998).

The problem that prompted this research is that Kings Point Volunteer Fire Department does not have experienced fire officers to manage incident command responsibilities in complex and difficult incidents. In this small rural, community, there are no opportunities to rehearse or practice with real emergency incidents which are considered complex or difficult. Because of this, chief officers have only managed single family dwelling fires. This inexperience in complex fires and/or emergency incidents regarding command responsibilities can cause chief officers to fail in observing essential visual cues, causing them to give conflicting orders and, as a result, cost lives (Farmer, 1998).

The purpose of this research, by means of literature review, questionnaires and interviews, was to evaluate computer-based technology to allow chief officers to learn, retain, and rehearse emergency decision-making and command responsibilities, and hence to support innovative teaching and learning applications for complex and difficult incidents. Historical research methods were employed to answer the following questions:

1. What are the deficiencies of current training methods for chief officers regarding complex and difficult incidents?
2. What are the advantages of computer-based multimedia simulation training?
3. What are some of the limitations and deficiencies of computer-based multimedia simulation?
4. Does computer-based multimedia replicate the reality of complex and difficult incidents?
5. Will computer-based multimedia influence learning?
6. Is training with computer-based multimedia simulation worth the expense?

BACKGROUND AND SIGNIFICANCE

Kings Point Volunteer Fire Department is a totally volunteer fire department that is under contract with Osceola County, Florida to provide first response basic life support and sole service fire protection to an area encompassing 14 square miles. Kings Point's fire district consists of low to medium density residential areas, rural and residential interface regions, medium density commercial, medium level industrial, and medium to high-speed intrastate highway systems. This once rural area has experienced tremendous growth in recent years because of the continuous encroachment of commercial and industrial businesses that support the vibrant economic environment surrounding Walt Disney World. Therefore, the number of both

emergent and non-emergent incidents to which Kings Point responds have increased, and the training and education of personnel to meet the rapidly changing number and type of incidents has become more and more prevalent. As a result, Kings Point has begun teaching chief officers command responsibilities for complex and difficult incidents using human mediated training exercises, such as assessment, tabletop, and live or field exercises.

Assessment exercises are one method of training chief officers which Kings Point has used. Assessment exercises attempt to create lifelike problems by having participants placed in the active role of a chief officer being confronted with a critical problem situated in a simulated emergency incident. Participants play the roles of various chief officers at different levels of complex or major incidents. The participants are evaluated for their analyzing, problem-framing, problem-solving, and critical thinking skills. Content knowledge is rehearsed and/or learned so those students can employ it to solve authentic problems in complex or difficult incidents.

Kings Point also has used tabletop exercises as another means to train chief officers. Tabletop exercises begin with a simulated, scale down version of a real-life situation or event, which can be used in many domains regarding command responsibilities. The exercise is designed to elicit constructive discussions by the participants as they attempt to examine, then manipulate materials and equipment while interacting with other chief officers to resolve problems based on existing emergency incident operations. In addition, tabletop exercises evaluate plans and procedures, as well as train chief officers in the coordination and assignment of responsibilities. Tabletop exercises allow participants to rehearse emergency command and control

skills in a non-threatening environment with minimal stress. Although tabletop exercises evaluate planning and procedures, “they do not address communication within the team which is central to effective management of large complex incidents or the management of resources…” (Williams, 1996, p.3).

The last method which Kings Point has used in training chief officers is live or field exercises in acquired abandoned structures. These abandoned structures are predominantly single family dwellings. This type of training exposes chief officers to many variables, which are essential in learning basic command responsibilities. However, this type of training is in a less stressful environment than complex incidents where chief officers need the training. Nevertheless, due to the logistics and environmental concerns, as well as restrictions placed on live fire training by the National Fire Protection Association (NFPA), this type of training is not readily available. Another concern with this type of training is chief officers learn, rehearse and practice the same type of emergency command responsibilities regarding control and communications skills which they experience in day-to-day operations.

Assessment, tabletop and live or field exercises have advantages, as well as limitations. However, because of the above-mentioned limitations, Kings Point Volunteer Fire Department needs to explore others methods of training chief officers for complex and difficult incidents. There needs to be more realism in which chief officers can experience the learning application of command responsibilities which test their deductive and critical thinking skills without exposing firefighters to hazards.

The problem addressed in this paper relates to the National Fire Academy’s Executive Development course, Unit 2, Professional Development. During the

presentation and discussion of Unit 2, the focus was on continuously searching for ways that chief officers can improve performance on a day-to-day basis, as well as focus on professional development. Part of the focus in class was determining preferred learning situations, which focus on improved performance. This paper will explore the importance of computer-based simulation as a means to enrich the success of chief officers on complex and difficult incidents using the research methodology discussed in the Executive Development course.

LITERATURE REVIEW

The literature review was performed to examine the training environments that are available for chief officers to use in the development of cognition and decision-making skills for complex and difficult incidents. The literature review involved a search of trade journals, textbooks, the Internet, and interviews. The following literature review provides additional support to parallel and correlate the research proposed. This section discusses:

1. Human Mediated Command Exercises
2. Training in Context
3. Training in the Experiential Environment
4. Computer-Based Interactive Training
5. Instructional Media and Technologies for Learning
6. Virtual Reality Training
7. Training in the Multimedia-Based Environment
8. Cost of Computer-Based Multimedia Simulation
9. Computer-Based Simulation Interview

Human Mediated Command Exercises

Assessment exercises are another medium to train chief officers in command and control skills. These exercises attempt to originate lifelike problems to evaluate a

participant's analytical, problem-framing, problem-solving, and critical thinking skills. Cook (1989) wrote assessment exercises "use standard checklists, to assess the various command and control attributes" (p. 3). Some of these attributes are "effective communications, confidence, clarity of orders, and enforcement of safety procedures" (Cook, 1989, p. 3). Also according to Paul Black and Dylan Wiliam (1998) there are many limitations with assessment exercises, such as quality control problems, focusing on the wrong achievement targets, instructors unaware of what they are assessing, poor-quality exercises, and evaluative standards. Interestingly, Black & Wiliam (1998) also suggested that there is research-based evidence that improved assessment exercises lead to significant learning gains.

During a presentation at Disaster '98 in Orlando, Florida, Don Abbott (Personal communication, February 19, 1998) stated the Abbottville Table Top Scenario is an activity in which chief officers and key agencies are presented with simulated emergency situations, without time constraints, to learn command and communication skills. Abbott (1998) distributed an unpublished paper that suggested that the Abbottville Table Top exercise was designed and executed to elicit constructive discussion by the participants, as well as for the participants to come away from the experience with a better understanding of command responsibilities. Abbott (1998) suggested that even with the realism of the emergency simulation through messaging, the tabletop exercise strives to keep levels of stress and frustration low. He also suggested that there was no time schedule for sending messages and no rigid schedule. Additionally the facilitator could stop the exercise at any given point and discuss the problem. According to Roderick Williams (1996) tabletop exercises are

popular training devices and have been specifically recommended for multi-agency training. He also suggested tabletop exercises allow participants to discover the priorities and plans for jointly managing emergency incidents. However, Williams (1996) wrote tabletop exercises “do not address communications within the team which is central to effective management of large complex incidents” (p. 3).

Another form of human mediated training is live or field exercises in abandoned structures to train and teach chief officers command skills. The primary objective of live exercises is to ensure that each chief officer, as a participant, accurately learn and retain command and communication skills, as well as tactical strategies. This training technique presents difficulties since abandoned structures for live training fires are not readily available.

Training in Context

Brian Crandell (1993) wrote, "training in context involves training in tactical or strategic wholes, not in parts, by re-creating operational conditions as closely as possible" (p.38). Bruce Roemmelt (1995) also wrote, "the learning process in training in context is very effective. It is enhanced by the students' awareness of their individual role in each tactic, or group of skills, performed on the fireground to achieve the overall strategic objective" (p. 25). Context training involves tactical training as closely related to the real incident as possible without the risks involved, such as those encountered with the actual incident. Crandell suggests that the training setting be identical to the environment that firefighters would experience in the actual incidents, in that firefighters will learn more effectively and efficiently if information is learned in context. Also, “training in context increases self-esteem of the learners when they as a group meet the

standard” (Roemmelt, 1995, p. 25). Training in context includes psychomotor, cognitive and affective domains. During “training in context, a strong sense of respect, trust and understanding is built among the learners” (Crandell, 1993, p. 39).

Crandell (1993) wrote that, in addition to training in context, "perfect process practice" (p. 39) helps the learner reach the desired standard which the instructor is trying to achieve. He defines psychomotor skills as "perfect process practice which means that the member meets all sequence and technical skill quality indicators with or without the assistance of an instructor, in whatever time is necessary to complete the tactic" (p. 40). Roemmelt’s (1995) writings parallel the statement made by Crandell (1993) and suggest that training in context is the learning’s primary responsibility. However, Roemmelt (1995) takes it a step further and suggests that learners are trained in learning teams, and, in addition, they “must focus on quality, quantity, safety, and time” (p. 25) during the learning process. Crandell (1993) also added that the purpose of practice for sequence is to give members an opportunity to learn the activity sequence of the parts of the tactic and the operational relationships affecting the tactic. During practice for sequence, firefighters, as a team, walk through the physical movements of the tactic and talk through the cues, supporting each other. The instructor and other firefighters on the team provide corrections as needed to assure perfect process practice. James Staseske (1997) analogized Crandell’s views on learning by stating it was important for learners to practice in a group setting while using “hands-on” training to learn psychomotor skills.

Crandell's (1993) observations and experience have shown that, on average, two repetitions of practice for sequence are needed. Once the firefighters, as a team, have

demonstrated the tactic in the correct sequence, they then practice for technical skills. "Practice for technical skills focuses on technical competence developed within the framework of correct sequence" (p. 42). Once the practice for perfect and technical skills is completed, the firefighters then practice for standard. When the standard is met, and all sequence and technical skill quality indicators are met, and the time meets the standard, which has been identified for a safe operation, no further instruction is necessary. Firefighters should be "encouraged to recognize that frequent practice is necessary to retain tactical skills for on-demand, to-standard performance" (p. 42).

Training in the Experiential Environment

Mel Silberman (1990) wrote, "active training promotes learning by doing" (p. 95). He considered experiential learning at an even greater premium than participatory learning. Also, James Staseske (1997) wrote that, as adult learners, "firefighters react to the way they have been trained" (p. 16), referring to experiential learning through participatory and actual incidents. Staseske used the analogy of a firefighter pulling hose and extinguishing the fire by a direct or indirect method, as well as firefighters continuing “to make improvements as they practice various command skills” (p. 16).

Experiential learning helps learners become "aware of their feelings and reactions" (Silberman, 1990, p. 95). Experiential learning approaches defined by Silberman are: "role playing, games and simulations, observation, mental imagery, writing tasks, and projects" (p. 96). Role playing, as described by Silberman (1990), "is the best known way to help participants both experience certain feelings and practice certain skills” (p. 96). Silberman divided role playing into scripting, formatting and processing. With scripting, the participant is given a scenario/script and asked to fill in the details. In formatting, several role players are given the same situation to observe more than one style. Processing describes behaviors observed during the role-playing.

Games and simulations "used appropriately can be an enjoyable and effective way to advance training objectives" (Silberman, 1990, p. 100). Games and simulations can test the behavior and performance of participants, which may be demonstrated in

actual incidents, as long as they are relevant to the participants. In addition, games and simulations can be highly motivating, as long as the competitive environment does not overshadow the educational objective (Heinich et al., 1993).

Staseske (1997) described discrete skills as having a “distinct beginning and ending point” (p. 16), with the second phase being the observation of someone demonstrating a task. According to Silberman (1990), observation is watching others without directly participating in the task. Silberman (1990) wrote, “observation can be an effective way to experience learning. Although it is worthwhile for participants actually to practice something" (p. 106). In addition, Silberman (1990) described mental imagery as “the ability to visualize an object, person, place, or action not actually present" (p.109). Silberman (1990) described six kinds of imagery experiences: "visual imagery, tactile imagery, olfactory imagery, kinesthetic imagery, taste imagery, auditory imagery" (p. 110). He described mental and visual imagery as powerful components to aid learners in retaining cognitive information. Silberman (1990) suggested exercises involving mental and visual imagery followed by discussion will bring skills and events into focus.

Computer-Based Interactive Training

Several authors of computer-based training recognized that computer-based media software provides the user with the ability to move within a particular set of information without a predetermined structure or sequence literature (Cordell, 1983; Farmer, 1998; Heinich et al., 1993). Polly Campbell (1996) wrote, “standard forms of training, such as videos and lectures, are passive. Interactive computer-based training requires the participant to pay attention and respond” (p. 30). To emphasize this statement, Campbell (1996) referenced a study in which Price Waterhouse, an accounting firm, showed a 50% higher retention rate among participants using computer-based training than participants using standard educational methods. Also, this form of training “can provide a structured program of learning experiences to

individuals and groups, with a special emphasis on multi-sensory involvement" (Heinich et al., 1993, p. 229). Campbell (1996) mirrored Heinich et al. (1993) regarding computer-based training and adds "assuming that a program is well designed and truly interactive, participants will learn more, faster" (p. 30). Bernie Roehl (1995) even took multi-sensory involvement a step further suggesting that participants could learn from each other faster in a distributed virtual reality environment. According to Roehl (1995), participants would move around in the distributed virtual reality environment, interacting to each others actions and decisions, such as a "multi-player arcade game" (p. 1).

Instructional Media and Technologies for Learning

One form of multi-media learning, which Heinich et al. (1993) described, was computer-based interactive video. This format of learning "capitalizes on the features of both video and computer-assisted instruction" (p. 236). Interactive video allows the learner to see and hear the pictures and sounds as they make an active response that affects the pace and sequence of the presentation. Kozma (1994) wrote, "learning is an active, constructive, cognitive and social process by which the learner strategically manages available cognitive, physical, and social resources to create new knowledge by interacting with information in the environment and integrating it with information already in memory" (p. 11). Heinich et al. (1993) also wrote that this form of learning through interactive computers is a "powerful, practical method for individualizing and personalizing instruction" (p. 236). Interactive computers provide a fully interactive response driven by a learner's decision and ability to receive information presented in video and audio formats. After the learner's response to the information, the computer will then branch to the appropriate point in the program based upon the response.

Heinich et al. (1993) said that this form of learning can be used for large group instruction, as well as individualization. Some other advantages are the simulation experiences provided through multi-senses, flexibility where the learner may choose what to study, and learner participation because it requires the learner to engage in the activities. However, some limitations are the cost and production expense to produce videodiscs.

Virtual Reality Training

In one article on virtual reality training, Curtis Cordell (1983) focused on training Navy personnel using simulated fires, as well as curriculum materials and instruction. Cordell called this type of training "Training Effectiveness Evaluation (TEE)." The fires were in a safe, non-pollutant, computer controlled, simulated shipboard environment. Cordell had two teams of 15 to 16 people with varying amounts of firefighting experience involved in the evaluation. Both performance and knowledge testing were used, and a student attitude questionnaire was administered. In addition, specific observations were made of the components of the overall training system. It was determined that the computer controlled simulated fire training provided effective training for firefighting in the Advance Fire Fighting Training System.

Ken Farmer (1997) in his article also noted the need for computer-based simulated fire training. He referenced a study that was completed by Teesside University of Durham, England in August 1997, which revealed, “most airport incident commanders rarely get real aircraft fire and crash experience. And their inexperience was likely to cost lives” (p. 23). Farmer’s (1997) description of the research conducted by Teesside University showed “airport incident commanders failed to observe essential orders and visual cues, forgot orders or gave conflicting orders, were unable to cope with issuing basic commands, and showed unhealthy signs of stress when confronted

with multiple information and an urgent need for key decisions" (p. 23). He also wrote that as a result of this study, virtual reality computer-based systems were "developed by Environmental Tectonics Corp. (ETC) in cooperation with the Royal Air Force (RAF) and Teesside University in England" (p. 23). The system is called Advanced Disaster Management Systems (ADMS VR) and is designed to train RAF fire crew commanders in the basic principles of command and control by the use of a computer-based simulator system.

Farmer (1998) draws a number of conclusions on the limitations of ADMS VR, such as not every detail is present. For instance, fire personnel are stiff figures and "look more like toy soldiers than real people" (p. 25), and the buildings are generic. Another major limitation is the cost of the ADMS VR, six to seven figures, depending on the complexity of the system. Farmer (1997) lists several virtual reality system benefits, such as "the ability to freeze or repeat a scenario, the ability to review and critique your response time and reactions, the ability to provide immediate feedback and documented results, the ability to provide team training, a comprehensive standard scoring system of individual results, and distance learning" (p. 24).

Farmer (1997) wrote, the next wave of training technology will be virtual reality and will "save some lives and give us worthwhile training without the safety and environmental issues that hamper hands-on training in the real world" (p. 25). In another article, Ronny Coleman (1994) described virtual reality as "sensorience, a term that combines the words 'sensory' and 'experience' and is defined as the acquisition of knowledge, skill and ability through sensory input using artificial environments" (p. 28). He used a hypothetical situation of a captain being in a hazardous environment where

bad decisions only resulted in a low score. Whereas, in a real-life situation, the results would have been severe injuries and/or fatalities to the firefighters. Coleman (1994) also stated, “if the fire service fails to use virtual reality, it could well be passing up one of the tools it needs for its own survival” (p. 28). He also listed three reasons why the fire service needs to use virtual reality. First, fires are becoming more complicated and complex because of hazardous materials. Second, firefighters have fewer chances to rehearse or practice firefighting skills because complex fires are occurring less frequently. “Finally, as always, the consequences of poor decision-making are measured not only in property loss, but also in firefighter injuries and fatalities” (p. 28).

Coleman (1994) wrote that not all firefighters have the same experience and for “every seasoned combat fire officer… there are literally hundreds of command officers who have never fought a fire any larger than one in a single-family dwelling. They have never faced up to the fact that they might have to make a split-second life-or-death decision” (p. 30). He also believes that many firefighters are well trained in accomplishing their task of pulling hoses, raising ladders, “yet they are being led by officers who don’t have much more experience in critical decision-making than they do themselves. Moreover, many fire officers have focused so much on the physical act of firefighting that they have failed to develop their critical decision-making skills” (p. 31).

Coleman’s (1994) suggestion is to develop consortiums so computer-based virtual reality simulations of fireground operations can be accessible to the state and/or National Fire Academy in order to train chief officers in difficult or complex situations. He also believes that a little stress is needed in order for individuals to make good decisions which is known as “eustress” and “virtual reality can simulate that stress, and as a result, we can learn more from it” (p. 32). Cook (1989) expanded on Coleman’s observations by adding that if students are not trained under realistic and stressful

conditions, then the students ability to perform under stress will deteriorate when the levels of stress is raised during a real life emergency. In addition, Cook (1989) concluded if the correct levels of stress were applied during simulation training, in an appropriate manner then it would improve the effectiveness of the training.

Cost of Computer-Based Multimedia Simulation

Bradon Hall (1996) wrote, "multimedia tends to cost more for development (for the hardware, software, and other technology) and less for delivery because the training can be delivered simultaneously to a large audience at multiple sites" (p. 77). Ken Farmer's (1998) article agrees with Hall's (1996) article about the price. Farmer (1998) adds that the "price of multimedia training takes the system out of the reach for most fire departments and training centers" (p. 24). Hall (1996) suggests that training which is instructor-led tends to cost less for development. However, instructor led training cost more for delivery. Hall (1996) used three case studies in his article to illustrate that multimedia training was less expensive than instructor-led training over a long period of time. Additionally, multimedia training saved organizations money when training a larger audience at multiple computer stations. Farmer (1998) also suggests that it is less costely when the computer-base multimedia system is circulated to several stations, with supplemental immersion training taking place at a regional location. Hall (1996) wrote "technology-based training and performance support are here to stay, and their effect on our field will continue to grow" (p. 78). Ralph Huber (1999) compared the cost of training with computer-based technology to real-life experiences by asking the question, "will his or her training come with millions of dollars of property lost and 100's of lives at stake?" (p. 22).

Computer-Based Simulation Personal Interviews

An interview was conducted with Ralph Huber, (Personal interview, July 30, 1998), Marketing Coordinator, Environmental Tectonics Corporation Simulation and Training Division, Orlando, Florida, during a presentation of the Advanced Disaster Management Systems or ADMS-TM for virtual reality incident command training. In addition, a second interview was conducted with Huber (Personal interview, January 24, 1999) after a presentation at Fire East in Jacksonville, Florida. Huber (1998) suggested that the design of the ADMS-TM is to use 3-D animation to train chief officers in disaster

management responsibilities of incident command scenarios. Huber's (1998) perception of computer-based training is that as the fire service moves into the 21st Century training for sophisticated emergency will require sophistic training technique. Huber's (1999) perspective of computer-based training has not changed since the earlier interview. In addition, He stated the ADMS-TM uses three scenarios which allow chief officers to learn, retain, rehearse emergency command, and communication skills. The scenarios include an aircraft disaster, a military/commercial helicopter emergency, and a hazardous materials incident with an overturned tanker. Additionally, Huber (1999) used several other acronyms for the ADMS-TM, such as the ADMS VRTM and ADMS TM. Huber (1998) suggested that the only limitation of computer-based training, such as the ADMS-TM, would be cost. However, will the cost be in his or her training, or will it come with millions of dollars of property damage or lost, as well as the possibility of the lost of lives?

A second interview was also conducted with Roger Huder, (Personal interview, December 12, 1998) Lieutenant, responsible for technical support for the City of Orlando Fire Department. The interview was an investigation of his perceptions of training procedures using computer-based simulation. Huder believes there is a need for computer-based training to assist in the development and practice of skills. He also believes it is important for the learner, whether learning psychomotor skills or cognitive skills, to be able to record and playback his or her actions and/or decisions to better understand their results. Computer-based training provides this with an instant playback. Also, through computer-based training, the learner is immersed into the scenario, as is a child when playing computer games, whether it is on a computer or a television type game like Sony PlayStation ®.

Lastly, an interview was conducted with Major Greg Martin, (Personal interview, January 10, 1999), Chief, Pentagon's Army Training Branch, Consequence Management Program Integration Officer, Washington, DC. The Army has developed an interactive computer-based training program for consequence management. Martin's perception of computer-based simulation is that it provides an opportunity to coordinate multiple units or incidents without using real resources and influences the way information is presented in the learning environment using interactive simulation. Also, it allows tactical forces to experience realistically applied scenarios with a moderate level of uncertainty to be applied for

rehearsal of a mission. Martin also states the department of defense has the largest simulation project under development within the United States for training consequence management.

Summary

There are a number of command exercises which have been created in simulators, computers, and/or models which allow chief officers to experience a small and infinite number of variables presented at complex incidents. "Some of these systems are entirely human mediated while others employ varying degrees of computer support" (Williams, 1996, p. 2).

Before any solutions can be rendered, the next logical step is to survey chief officers to determine their perspective of which visionary training methods can provide the best fire service training and education for complex and difficult incidents.

Once completed, this paper will give other chief officers at Osceola County Fire Rescue Department and the City of Orlando Fire Department the insight to establish and formulate training programs in their respective departments. It will provide the directions in which to start the groundwork for future studies.

PROCEDURES

The research procedure used in preparing this paper included a literature review, interviews and primarily involved the research questions. This paper explored preferred learning situations, as well as effective training methods for chief officers to learn complex and difficult incidents.

Definition of Terms

Advanced Disaster Management Simulator is a computer-based simulator that uses a high-speed microprocessor (Onyx 2 Silicon Graphics 1 System) that generates realistic mathematically based fire–related emergencies on a 360^0 screen. There are several acronyms used for the Advanced Disaster Management Simulator, such as the ADMS VR, ADMS TM, and ADMS VRTM. Each trade journal reviewed used a different acronym.

Cognition is the act or process of learning and becoming acquainted with the empirical factual knowledge.

Computer-Based Simulation is the discipline of designing a model of an actual or theoretical intellectual system, using a fully interactive high-speed microprocessor to simulate the emergency in a virtual reality environment. Typically, this requires 128 Megs of RAM to simulate real time emergencies based on mathematical models. Simulation uses the principle of “learning by doing.”

Complex and Difficult Incidents are situations that extend beyond typical or day-to-day operations and provide a high level of stress to both the organization and the individual.

Distributed Virtual Reality is a simulated environment which is run on several networked computers. This allows participants to interact in real time to each others’ actions and decisions, such as multi-player computer games.

Eustress is the physical and mental stress that is actually placed upon a participant in real life simulations.

Human Mediated is uses instructional technology that is human facilitated and which can be subjective to evaluate training exercises.

Interactive involves the use of user input to facilitate, guide, or determine the direction or content of a situation.

Multimedia is the simultaneous use of a variety of media formats in a given environment or self-study program.

Multi-sensory involves the use of two or more senses, more than one type of medium, and is organized around a single topic.

Sensorience is the acquisition of cognitive and psychomotor skills through sensory input using artificial environments based upon the sensory acquisition gained within the experience.

Simulation is the environment, inhabitants, and simplification of a scaled down version of a real life situation, which behaves realistically, both physically and functionally, that is, portrayed by computer graphics.

Virtual Reality is a computer-controlled environment in which participants use multi-sensory to interact with what would normally be in the physical world.

3-D Training Environment is computer driven graphics that are projected onto a curved screen located in front of a participant. This includes a 3-D (surround sound) sound system which emanates sound from the appropriate direction of either the apparatus, people, fire, and/or any real-world simulation.

Research Methodology

Literature Review

The research was historical research in that a literature review of academic publications was conducted to understand computer-based simulations to support training and instruction for chief officers involving complex and difficult incidents. The historical research was initiated at the National Fire Academy Learning Resource Center, and continued with the academic publications at the University of Central Florida library in Orlando, Florida. An additional literature review was conducted on the Internet using search engines to explore computer-based simulation training.

The literature review targeted academic research publications and trade journals that explored the use of computer-based simulation to support training for complex and difficult incidents. The literature review also examined current training methods for chief officers in the management of complex and difficult incidents.

Interview

A personal interview was conducted with Ralph Huber (July 30, 1998), of Environmental Tectonics Corporation, Marketing Representative for the Advanced Disaster Management Systems or ADMS-VR for virtual reality incident command training in Orlando, Florida. Also, a second interview was conducted with Huber (January 24, 1999) at the Fire East conference in Jacksonville, Florida. In addition, a personal interview was conducted with Roger Huder, (December 12, 1998), Lieutenant, Technical Support for the City of Orlando Fire Department. Lastly, a personal interview was conducted with Major Greg Martin (January 10, 1999), Chief, Training Branch of the Army's Consequence Management Program Integration Officer. The purpose of the interviews was to gain background knowledge and significant information on computer-based simulation training and to solicit any visionary thoughts on training chief officers in complex and difficult incidents. The interview questions are listed in Appendix (A).

Summaries of the interviews are included in the Literature Review section of this research paper.

Instrumentation

The instrument used in this research consisted of a demographic sheet (Appendix D) and a two-part questionnaire. A cover letter was attached to each survey (Appendix B - Osceola, Appendix C - Orlando). The cover letter explained the purpose of this research and how the results of the survey would be utilized. It encourages cooperation and confidentiality, and offered a copy of the summary results if desired.

The survey questionnaire appears in its final form in Appendix (E). The questionnaire was administered to chief officers during a mutual aid meeting in Osceola County. Also, the questionnaires were given to chief officers while on duty at the City of Orlando Fire Department. The chief officers were given an explanation as to why the questionnaire was being presented, and each chief officer was directed to complete the questionnaire as prescribed in the directions at the top of each part of the questionnaire. Upon completion, the surveys were collected and put in an envelope to analyze the data once the target group was surveyed. No chief officer was allowed to take the questionnaire from the survey room or allowed to fill it out later and return it to this author.

Questionnaire Procedure

In Part I of the questionnaire, each chief officer was asked to identify which type of multimedia technology his or her department currently used. In Part II of the questionnaire, each chief officer was asked to reflect on his or her department's past method of training chief officers. In addition, they were asked to consider several innovative teaching and learning applications which could be utilized now to provide the best fire service training and education for chief officers regarding complex and difficult incidents. Finally, they were asked their preferred learning situations.

After each chief officer completed his or her surveys, they were thanked for his or her time and participation.

Assumptions and Limitations

The questionnaire had several assumptions and limitations. One assumption was that all chief officers are trained under the State of Florida's Compliance of Standards whether it be the 160+ hour volunteer firefighter standards, or 450+ hour career firefighter standards, as well as hold a fire officer certificate from the State of Florida. In retrospect, this item should have been part of the demographic survey. However, as a result, some of this information was obtained through interviews with some of the respondents. This assumption should not present any problems and/or unexpected outcomes because (1) the research targets the visions of chief officers, as well as (2) innovative teaching and learning applications, and (3) preferred learning situations to provide chief officers command responsibilities, rather than fire fighting cognitive and psycho-motor skills.

One limitation of the questionnaire used was the open-ended question format. Many of the respondents who completed the surveys were resistant and reluctant to write down answers to the questions. The intent of the open-ended questionnaire format was for the author to gather visionary, innovative teaching and learning applications, as well as perceived barriers and preferred learning situations without artificially inflating or deflating the perception of the respondents.

The questionnaires were limited to a small group of respondents within Osceola County Fire Rescue Department volunteer chief officers and the City of Orlando Fire Department chief officers. A questionnaire distributed nationally may have provided additional information of visionary, innovative teaching and learning applications, and preferred learning situations for chief officers. However, because of the time restraints to complete this paper, a smaller number of respondents were chosen. In addition, because of the small number of respondents sampled, the information may not be considered as representative of all chief officers. Nonetheless, the information obtained was essential to this research.

Lastly, some of the respondents might have felt they had to answer a certain way to ensure the success of the questionnaire.

Survey: Definition of Population

The questionnaire was given to 30 chief officers from 12 different departments to analyze their visionary, innovative teaching and learning applications and preferred learning situations. The purpose of the questionnaire was to (1) quantify the number of chief officers that used computers in their day-to-day operation, (2) to determine visionary, innovative teaching and learning applications of the chief officers

surveyed, (3) identify perceived barriers, and (4) to determine the preferred learning situations of the chief officers surveyed.

Populations of the Survey

The population completing the questionnaire included 12 fire departments and 29 chief officers from the rank of district chief and higher.

Collection of Data

There were 29 questionnaires completed out of a possible 30 for a 96% response rate.

RESULTS

The results review answers to the research questions and results of the surveys and questionnaires.

Answers to Research Questions

Research Question 1. What are the deficiencies of current training methods for chief officers regarding complex and difficult incidents? Assessment, tabletop and live or field exercises are currently the most common methods of training chief officers in command responsibilities for complex and difficult incidents. The research has shown that these three methods of training chief officers have many deficiencies. One deficiency is facilitating assessment, tabletop and live or field exercises. The evaluators or instructors must use a checklist to assess the various command responsibilities. Also, attempting to rigidly follow the check list raises a number of problems, such as the evaluator or instructor leading the exercise in his or her direction, rather than allowing the participant to go in a different direction giving consideration to the fact that there is more than one way to command any incident. In human mediated exercises, it is difficult for evaluators or instructors to assess the desired skills and knowledge because generally the scenarios are written for one outcome. Another deficiency is that none of these training methods assess chief officers or participants under the high stress levels that are inevitable at complex or difficult incidents.

Research Question 2. What are the advantages of computer-based multimedia simulation training? Research has shown that some other means of training chief officers, such as computer-based multimedia simulation is required to augment the existing methods. One advantage is that computer-based multimedia simulation

applications could be used to reduce the financial cost of reproducing live or field exercises, as well as reducing the environmental impact and firefighters' injuries and/or fatalities as a result of live or field exercises. Because of improved technology and safety awareness, there are fewer complex and difficult incidents occurring for chief officers to rehearse their command skills. Another advantage is that with computer-based simulation, chief officers can rehearse their command skills, even if a poor decision is made, without the fear of property lost and/or costing a firefighter their life. Several articles found during the literature review stressed the importance of rehearsing command skills under stress. With computer-based simulation, chief officers can be trained under low stress conditions. Then as he or she becomes more familiar with the escalating event, more stress is applied. The advantage of this is that chief officers will be able to perform during a real incident, under stress, when faced with an incident that is deteriorating. Another advantage is that a chief officers who is susceptible to stress to the point that it interfers with their command skills and abilities in complex incidents can be discovered before being placed in a real complex and/or difficult incident. One additional advantage is computer-based simulation can also be stopped during any incident to allow chief officers to see how his or her decisions and actions realistically affected the situation. Computer-based simulation can also be saved and reviewed to allow facilitators to debrief chief officers, as well as support experimentation with different tactics to see the outcome. With the human mediated exercises, the same scenario is used over and over and is controlled by the evaluator or instructor. Also, the same scenario is used because of the amount of time required for designing and planning. The advantage of computer-based simulation is that there can be an infinite

number of unpredictable scenarios in which the outcome of the incident depends directly on the actions and decisions of the chief officer. Lastly, computer-based multimedia allows for distance learning.

Research Question 3. What are some of the limitations and deficiencies of computer-based multimedia simulation? It was found during the literature review, interview, and presentation that none of the computer-based multimedia simulators currently being used present reality in every detail for visual acuity. In a review of the ADMS VR, Farmer (1998) wrote some of the deficiencies are the equipment, "pumpers lack gauges and levers, … personnel in the scenes are stiff figures that look more like toy soldiers than real people" (p. 25). Also, Huber (1998) referred to these same limitations during his presentation. Williams (1996) also noted in his research of computer-based simulation in England, that buildings, equipment and personnel all look generic.

Research Question 4. Does computer-based multimedia replicate the reality of complex and difficult incidents? As mentioned above, current technology regarding computer-based multimedia simulation does not replicate the details of equipment and the natural movement of personnel, and may seem primitive by the standards seen in many of the current movies using computer-based simulation disciplines. However, computer-based multimedia simulation responds realistically to the decisions and actions of the participants by using mathematical models of actual incidents which has been digitized in a 3-D environment. This realistic response by the computer is vital for chief officers to learn how to manage complex situations.

Research Question 5. Will computer-based multi-media influence learning?

During the literature review, many of the authors, such as Kozma (1994), Staseske (1997) and Silberman (1990), all parallel each others writing, suggesting that learning is through experience. Each of these authors referred to playing games on simulators as an effective means to learn because of the multi-sensory affect. Kozma (1994) expounded on this belief by using the old phrase that people remember 20% of what they hear, 50% of what they see, and 70% of what they see and hear. In addition, Kozma (1994) and Silberman (1990) suggested that multimedia-based training depended upon the interaction of the participants to learn or develop interactive skills. Also, computer-based multimedia will increase participants' capacity to interact with data by presenting the information in multiple ways to influence the learning process.

Research Question 6. Is training with computer-based multimedia simulation worth the expense? The literature review indicates that the cost of a computer-based multimedia system can fall between six and seven figures, depending on the complexity. However, if the audience is large enough to offset the high cost of development, then computer-based multimedia simulation is worth the expense. Also, Hall (1996), showed several studies that compared instructor-led training to computer-based multimedia delivery during a three-year period and over all, the computer-based multimedia delivery system resulted in a significant return-on-investment.

Results of the Survey

Demographic Characteristics for Osceola County Fire Rescue Department

Twenty volunteer chief officers of the nine fire districts within Osceola County completed the survey. Most respondents reported 1-5 and 16-20 years of service representing 38 % and 33% respectively.

The majority of the sample population included assistant chiefs (52%), followed by deputy chiefs (5%) and finally, fire chief officers (43%).

Males made up 76% of the population. The majority of the sample group was between 31-45 years of age.

One hundred percent (100%) of the survey group was Caucasian. Five percent (5%) of those cited Hispanic heritage.

Additional demographic information can be found in Appendix F.

Demographic Characteristics for the City of Orlando Fire Department

Nine chief officers from the City of Orlando Fire Department completed the survey. Most respondents reported between 21 and 25 years of fire service.

The majority of the sample population included district chiefs (77%), followed by assistant chiefs (23%).

Males made up 88.5% of the population. The average age of the sample group was between 35-45 years.

Eighty-eight and one half percent (88.5%) of the survey group was Caucasian , eleven and one half percent (11.5%) of the survey group was African-American. Eleven and one half percent (11.5%) of the population cited Hispanic heritage.

Additional demographic information can be found in Appendix G.

Most Significant Demographic Data

The most significant demographic data of the 96% chief officers surveyed, whether volunteer or career, is that they only had a high school education and/or some college. Table 1 below shows the responses based on department type and the corresponding response percentage.

Table 1. Number of Responses Based on Education

EDUCATION	Career	%	Volunteer	%
High School	0	0%	12	60%
Some College	5	55%	4	20%
College – Associate of Arts/Associate of Science	1	11%	2	10%
College – Bachelor of Arts/Bachelor of Science	1	11%	1	5%
College – Graduate Degree or Graduate Classes	2	22%	1	5%

Part I. The Instrument

Part I of the questionnaire requested that each respondent check the type of multimedia and/or computer-based technology which they had in their department. One hundred percent (100%) of the respondents used some type of computer-based technology in their department, as well as having access to the Internet. Table 2 below shows the responses based on department type and the corresponding response percentage.

Table 2. Multimedia Technology in your Department

Telephone	Career	%	Volunteer	%
Audio tape player	9	100%	5	25%
Television	9	100%	20	100%
VCR	9	100%	10	50%
XT/AT1286 PC	0	0%	0	0%
386/486 PC	9	100%	20	100%
Multimedia PC with CD ROM	9	100%	20	100%
Local area network (LAN) PC based	9	100%	0	0%
(LAN) with CD ROM capability	9	100%	0	0%
INTERNET access	9	100%	20	100%

Part II of the questionnaire requested visioning information from chief officers regarding visionary, innovative teaching and learning applications, and preferred learning situations. The survey asked for several items that should be implemented “today” to provide the best fire service training and education for chief officers in complex and difficult incidents. The most significant answer was human mediated

training using live exercises with a more experienced chief officer assisting. The second question asked for several items that should be implemented "in the next few years", which was defined as within the next five years. The most common answer was computer-based training which was interactive and realistic. Table 3 introduces the categories and the selected responses representing both the "today" and "in the next few years" time frames in four basic categories: access, technology, specific programs, and institutional linkage.

Table 3. Selected Responses

Category	"Today"	"In the next few years"
Access	Offer more training. Make training for chief officers more realistic. Hands-on training with experienced chief officers.	Make Internet training available on-line. Make training available at NFA.
Technology	Make computer-based training available on-line.	On-line computer-based training. Make computer-based training CD interactive
Specific Training	Live fire training for chief officers.	Simulated live fire training. Interactive and realistic simulated training.
Institutional Linkage	Training through community college. Establish college credit for training.	Enhance command training at the NFA.

The third question inquired about perceived barriers for using computer-based technology to support innovative teaching and learning applications? One hundred percent (100%) of the respondents listed cost of technology and year 2000 (Y2K) as their perceived barriers. The final question asked the chief officers to list their preferred learning situations. The following were the main categories listed on the questionnaire as their preferred learning situations: (a) new experiences, (b) games, and (c) opportunities to practice with "hands-on" then receive feedback.

DISCUSSION

It is the consensus from questionnaires and the opinion of those interviewed that some other form of training is needed to augment existing training for chief officers regarding complex and difficult incidents. The main concern of several chief officers responding to the questionnaire and interview was that they seldom have a chance to command routine incidents, nonetheless, complex incidents under stressful conditions where they have to take immediate and effective command of the escalating incident. Most chief officers and their departments had some method of training their personnel in command responsibilities. The most common method was the tabletop exercise. However, tabletop-training systems were human mediated, pre-scripted pencil and paper checklist type exercises, administered by a facilitator with peers evaluating their response to an imaginary emergency. The respondents did not feel comfortable with this type of training because they trained in a passive environment and only needed to state their intentions based on their department's standard operational plans to make a passing score. They also felt that tabletop exercises did not test their decision-making skills, only their communications skills and their ability to communicate between the facilitator and other role players.

A second method was through assessment type exercises where chief officers are placed in a simulated emergency incident in which role players respond to decisions or actions the chief officer, as the participant, made from a written scenario. Chief officers are then evaluated on their analyzing, problem framing, problem solving, and critical thinking skills based on a subjective evaluation. One problem with assessment

type exercises is that chief officers can rehearse and/or learn specific word phrases to accommodate the evaluator or instructors without deductive or critical thinking.

The last command type of training mentioned by some of the respondents during the questionnaire and interviews, as well as the literature review, was live fire or field exercises to train their chief officers. The goal of live fire was to provide realistic and effective training for chief officers in decision making and communication skills in real time, as well as building in the element of stress. However, live fire or field exercises require many details and equipment and are potentially hazardous to the environment and those involved. Also, Williams (1996) suggests that live fire or field exercises are not the same as those experienced in the real world and the experience will give chief officers a “causal influence” as an end result.

Academic literature and trade journal literature reviews, as well as research study reviews, suggest that the application of computer-based simulation training would benefit chief officers when faced with complex and difficult incidents which rapidly escalates. In addition, the human errors which chief officers make, who have little to no command experience, could be significantly reduced or minimized in real world incidents if they were given the opportunity to train in a computer-based simulation under more realistic and stressful conditions. Williams (1996) also suggests computer-based simulations, which are more responsive where chief officers can see how his or her decisions and actions realistically affect the situation. These are more condusive to learning command responsibilities, as well as being consistent in the learning process and having a higher retention rate of subject matter. In addition, Huber (1999) suggested that with computer-based simulation training it is possible to stop the incident

to review the decision or action taken, save a snap-shot of the action, and resume the incident, allowing the chief officers to see the consequences of their decisions. According to Cook (1989), if the student is not trained under realistic and stressful conditions, then the "student's ability to perform the cognitive and psycho-motor skill learned under low stress simulated conditions is known to deteriorate when the level of stress is raised or when the student is faced with real responsibility for his actions" (p. 4).

Whether it is using human facilitators and/or computer-based technology, the objective of training chief officers for complex and difficult incidents is to maintain a consistent archetype to evaluate their cognitive skills and decision-making abilities. With human mediated exercises, it is difficult for facilitators to provide a consistent archetype of the decisions made during the exercises. This allows for disagreement over what precisely occurred (Williams 1996). Also, human mediate exercises all have to follow a well defined script. Many times the participant makes a request for or takes an action which has not been defined. Computer-based mediated exercises allow for interactive training by providing information that can rapidly escalate to reflect the situation as it affects them by video, or computer generated graphical views. The main objective in training chief officers command responsibilities is for them to have immediate feedback on how his or her decisions and actions are realistically affecting the outcome of the incident. Also, Cook (1989), Farmer (1997) and Williams (1996) suggest that for chief officers to learn command responsibilities, they need to be able to see the consequences of their decisions and actions in real time without placing human life in any life threatening or hazardous situation. Kings Point Volunteer Fire

Department, as well as all the departments that responded to the questionnaire, uses human mediated tabletop and live fire exercises to train chief officers in command responsibilities. This researcher argues that in order to properly train chief officers for complex and difficult incidents, the use of interactive computer-based simulation will be required. Computer-based simulation to support training for complex and difficult incidents will allow chief officers to learn, retain, and rehearse command responsibilities.

RECOMMENDATIONS

Through literature reviews, questionnaires and a series of interviews, it was found that many training methods are ineffective in training chief officers to manage complex and difficult incidents. The purpose of this paper was to evaluate computer-based technology to allow chief officers to learn, retain, and rehearse emergency decision-making and command responsibilities, and hence to ascertain or identify practical ways to support innovative teaching and learning applications for complex and difficult incidents.

In today's fire service, training has to be rapid and effective regarding training strategies because of the constantly changing educational demands resulting from the development of new technology. In addition, chief officers need the ability to act and use deductive thinking, as well as the ability to think critically and reflectively when dealing with command responsibilities. Currently, training and teaching methodologies for complex and difficult incidents are mainly human mediated through the use of assessment, tabletop, and live or field exercises. This research has identified the need for interactive computer-based simulation for training chief officers to manage difficult incidents. Previous training using human mediated exercises has been identified as seriously deficient. In addition, the opportunity for computer-based application is exceptionally high at the present time with technology evolving at exponential rates.

In order to accelerate the learning of command responsibilities for chief officers, the following recommendations are respectfully submitted to the Osceola County Fire Rescue Department and the City of Orlando Fire Department.

1. Provide educational environments that stimulate all the senses, such as computer-based multi-sensory simulation. Use a variety of visuals and props to help students connect to the subject, such as multimedia simulation. Use a "hands-on" approach which engages learners in physical activity, such as interactive computer-based simulation. Use visualizations from digitized actual incidents to tap into the experience and the senses, when appropriate.
2. Provide challenging teaching and learning interactions through computer-based multimedia simulation. Conduct group discussions after completing activities to identify essential thoughts, feelings, and behaviors and to find opportunities for connecting the training to realistic incidents. Conduct group discussions after reviewing the computer-based incident to provide closure to the learning activity.
3. Provide high levels of enthusiasm and preparation through the computer-based multimedia simulation. Use actual digitized pictures and color to stimulate and assist in accessing information and/or retention. Use realistic training for complex and difficult incidents which challenges the learner. Provide communication that is supportive with feedback at all levels of the computer-based simulated exercise.

Because of the current cost of computer-based multimedia simulation, Kings Point Volunteer Fire Department, as well as the Osceola County Fire Rescue Department and the City of Orlando Fire Department will not be able to utilize this application for chief officers. Eventually the cost of the faster microprocessors required to use virtual reality simulation will decrease. However, until then, there is still

the tremendous need to effectively train chief officers, and the implications of this type of training in a simulation environment has enormous potential. The recommendation of this researcher is for an agency, such as the National Fire Academy, International Fire Chiefs' Association, Florida Fire Chiefs' Association and/or the Florida State University System Board of Regents to purchase a computer-based multimedia training simulation which can augment the training of chief officers in complex and difficult incidents, which otherwise may be hazardous to firefighters and chief officers without proper training. In addition, an infrastructure should be developed to support the delivery of this technology via the establishment of an Internet service for fire and EMS personnel in a distributed virtual reality environment.

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APPENDIX A

PERSONAL INTERVIEW QUESTION

Consider your Department's past method of training chief officers and think about training chief officers today. Think of the entire fire service as you answer the following question.

As a visionary, what are your perceptions of innovative teaching and learning applications using computer-based technology to train and educate chief officers regarding command of complex and difficult incidents?

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APPENDIX B

SURVEY COVER LETTER FOR OSCEOLA COUNTY

All Volunteer Chief Officers
Osceola County Fire Rescue Department

Dear Fellow Chief Officers:

I need your help.

As a volunteer for Osceola County, you can provide me with information that can be used to research the need for computer-based training. Presently, I am enrolled in the National Fire Academy's Executive Fire Officer Program, and as a part of my studies, I am required to do a research paper. The project will focus on computer-based simulation to support training for complex and difficult incidents. Once completed, the volunteer fire chiefs and training personnel will review the results of this study.

Your full participation in the study will involve: (1) your completion and return of the enclosed two part questionnaire, and (2) your completion of the demographic background sheet.

For confidential reasons, names will not be needed or required. I will be the only person who will be able to link your name with the information you provide. After all my statistics have been compiled and analyzed, the demographic sheets will be separated from the questionnaire.

In order to insure that the results are valid, please do not discuss the questionnaire with fellow chief officers. It is vital that I receive information from you that has not been influenced by anyone else.

After the study has been completed, the results will be available from me upon request.

Thanks in advance for your time and participation in this study.

Sincerely,

Don Adams, Deputy Chief
Kings Point Volunteer Fire Department

APPENDIX C

SURVEY COVER LETTER FOR ORLANDO

Chief Officers
Field Operations Bureau
Orlando Fire Department

Dear Fellow Chief Officers:

I need your help.

Presently, I am in the National Fire Academy's Executive Fire Officer Program, and as a part of my studies, I am required to do a research paper. I have, with the approval of the Fire Chief, chosen to research computer-based simulation to support training for complex and difficult incidents. Once completed, the Fire Chief and training personnel will review the results of this study.

Your full participation in this research will involve: (1) your completion and return of the enclosed two part questionnaire, and (2) your completion of the demographic background sheet.

For confidential reasons, names will not be needed or required. I will be the only person who will be able to link your name with the information you provide. After all my statistics have been compiled and analyzed, the demographic sheets will be separated from the questionnaire.

In order to insure that the results are valid, please do not discuss the questionnaire with fellow firefighters. It is vital that I receive information from you that has not been influenced by anyone else.

After the study has been completed, the results will be available from me upon request.

Thanks in advance for your time and participation in this study.

Sincerely,

Don Adams, District Chief
Orlando Fire Department

APPENDIX D

DEMOGRAPHIC SHEET

Please indicate below in the appropriate category the requested information.

1. YEARS IN THE FIRE SERVICE:

- ☐ 1 to 5 years
- ☐ 6 to 10 years
- ☐ 11 to 15 years
- ☐ 16 to 20 years
- ☐ 21 to 25 years
- ☐ 26 years

2. RANK

- ☐ District Chief
- ☐ Assistant Chief
- ☐ Deputy Chief
- ☐ Fire Chief

3. SEX

- ☐ Male
- ☐ Female

4. RACE

- ☐ Caucasian
- ☐ African-American
- ☐ Asian
- ☐ Other

HERITAGE

- ☐ Hispanic

APPENDIX D (continued)

5. AGE

- ☐ 18-25
- ☐ 26-30
- ☐ 31-35
- ☐ 36-40
- ☐ 41-45
- ☐ 46-50
- ☐ 51-55
- ☐ 56-60
- ☐ 60+

6. EDUCATION

- ☐ High School
- ☐ Some College
- ☐ College – Associate of Arts/Associate of Science
- ☐ College – Bachelor of Arts/Bachelor of Science
- ☐ College – Graduate Degree or Graduate Classes

APPENDIX E

Multimedia Technology in your Department

Please check all of the following types of multimedia and computer-based technology that are available in your department.

Technology:

- ❑ Telephone
- ❑ Audio tape player
- ❑ Television
- ❑ VCR
- ❑ XT/AT1286 PC
- ❑ 386/486 PC
- ❑ Multimedia PC with CD ROM
- ❑ Local area network (LAN) PC based
- ❑ (LAN) with CD ROM capability
- ❑ INTERNET access

Other (please describe):

_____
_____
_____

Consider your Department's past method of training chief officers and think about training chief officers today. Think of the entire fire service as you answer the following questions.

As a visionary, what are several innovative teaching and learning applications that could be implemented now to provide the best fire service training and education for chief officers regarding command of complex and difficult incidents?

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APPENDIX E (continued)

Consider the changes that have occurred over the past several years as you answer the next question and envision those changes, which you think, may occur in the next few years.

If you had total utopian, what are several things that the fire service could do to provide the best training for chief officers to prepare them for complex and difficult incidents?

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If computer-based technology was used to support innovative teaching and learning applications for complex and difficult incidents, what are some of your perceived barriers?

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What is your preferred learning situation?

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APPENDIX F

DEMOGRAPHIC CHARACTERISTICS for OSCEOLA COUNTY FIRE DEPARTMENT

Years in the Department		
Number of years	Number of Personnel	Percentage
1-5	8	38%
6-10	1	4.5%
11-15	1	4.5%
16-20	7	33%
21-25+	3	14%

Rank			
District Chief	Assistant Chief	Deputy Chief	Fire Chief
0	11	1	9
0%	52%	5%	43%

Sex	
Male	Female
16	5
76%	24%

Race				Heritage
Caucasian	African-American	Asian	Other	Hispanic
20	0	0	0	1
100%	0.0%	0%	0%	5%

Age		
Range	Number of Personnel	Percentage
19-25	5	25%
26-30	2	10%
31-35	5	25%
36-40	3	15%
41-45	2	10%
46-50	3	20%

APPENDIX F (Continued)

Education Educational Level:	Number of personnel	Percentage
High School	12	60%
Some College	4	20%
A.A./A.S.	2	10%
B.A./B.S.	1	5%
Graduate Degree or Graduate Classes	1	5%

APPENDIX G

DEMORGRAPHIC CHARACTERISTICS for ORLANDO FIRE DEPARTMEHNT

Years in the Department Number of years	Number of Personnel	Percentage
1-5	0	0%
6-10	0	0%
11-15	1	11.5%
16-20	3	33%
21-25+	5	55.5%

Rank District Chief	Assistant Chief	Deputy Chief	Fire Chief
7 77%	2 23%	0 0%	0 0%

Sex Male	Female
8 88.5%	1 11.5%

Race Caucasian	African-American	Asian	Other	Heritage Hispanic
7	1			1

77%	11.5%	0 0%	0 0%	11.5%

Age Range	Number of Personnel	Percentage
19-25	0	0%
26-30	0	0%
31-35	1	11.5%
36-40	4	44%
41-45	3	33%
46-50	1	11.5%

APPENDIX G (Continued)

Education Educational Level:	Number of personnel	Percentage
High School	0	0%
Some College	5	55%
A.A./A.S.	1	11%
B.A./B.S.	1	11%
Graduate Degree or Graduate Classes	2	22%